A NOTE ON EXPERIMENTAL CROSSING OF AËDES (STEGOMYIA) SCUTELLARIS SCUTELLARIS WALKER AND AËDES (STEGOMYIA) SCUTELLARIS KATHERINENSIS WOODHILL (DIPTERA, CULICIDAE).

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(One Text-figure.)

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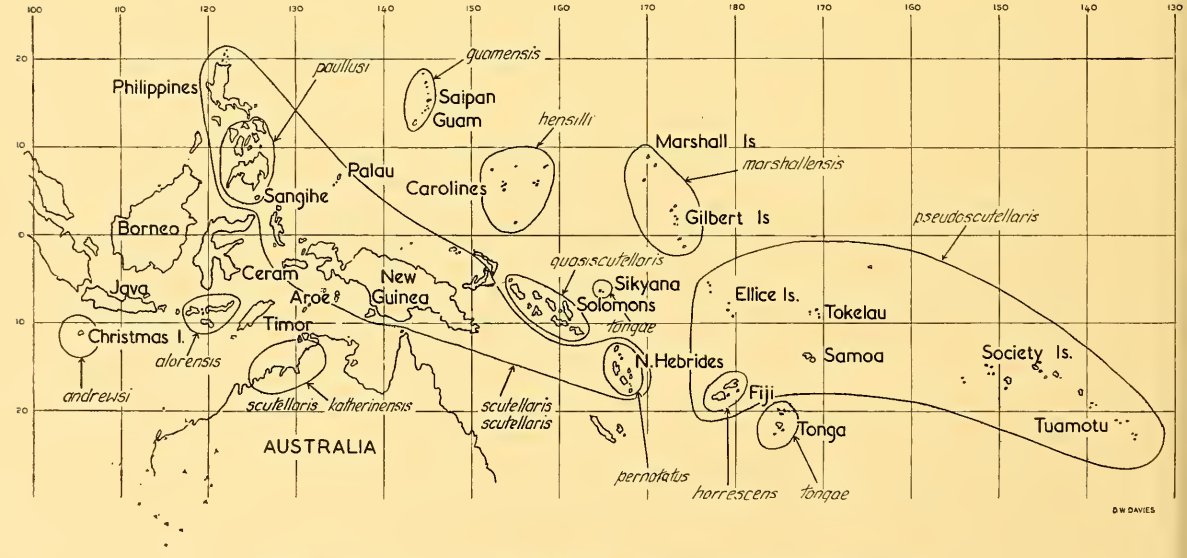
Introduction.

The "scutellaris group" of mosquitoes has been recorded from a wide area including parts of Polynesia, Melanesia, the Philippines, North Australia, the Netherlands East Indies and the Andaman Islands. Numerous varieties and subspecies have been described by earlier workers and considerable confusion existed, but in recent years our knowledge of the group has been greatly enhanced by the work of Farner and Bohart (1945), Stone and Farner (1945) and Stone (1947). These authors have straightened out the previous confusion in nomenclature and have described twelve forms, giving each of these full specific status. In addition, a form from North Australia has been described by the author (Woodhill, 1949) as a subspecies of *A. scutellaris* Walker. Some forms of this group have also been recorded (as *A. variegata*) from Celebes (Bonne–Wepster and Brug, 1932), Sumatra (Brug, 1931) and the Andaman Islands (Barraud, 1927)), but much more knowledge is required of this western portion of its range before any separation into species or subspecies can be made.

It will be seen from Text-figure 1 (based on the work of the authors mentioned above) that the "scutellaris group" presents a very interesting problem in speciation. The differences used to separate the species consist of small variations in the markings of the thorax, legs and proboscis and in slight variations in the structure of the basal



DISTRIBUTION of Aedes scutellaris Walk. and closely related species.

Text-figure 1.

lobes of the male genitalia. It has not been found possible to separate the larvae of any of the species, with the exception of *A. horressens*. The breeding habits and general ecology of all the species are similar, as far as is known, throughout the whole range. Farner and Bohart conclude from the differences in the genitalia and from the fact that two distinct forms may occur in the same area that they should be considered distinct species. However, further study may possibly reveal intermediate forms, and considerable light should be shed on the problem by attempts at crossing the different forms. It was with this in view that laboratory crossings were made by the author between *A. scutellaris scutellaris* Walker (= *A. scutellaris* Walker of Stone) and the newly discovered *A. scutellaris katherinensis* Woodhill.

Experimental Procedure and Results.

Laboratory cultures of *scutellaris* from Lae, New Guinea, and of *katherinensis* from Katherine, Northern Territory of Australia, were set up in small cages 12 inches by 10 inches by 10 inches, supplied with raisins and given a blood feed twice weekly. The temperature was maintained at 80°F. and the humidity at 70% to 80%. Eggs were collected on filter papers immersed in water and the larvae were fed on pulverized dog biscuit. Under these conditions, abundant eggs were obtained and continuous cultures maintained without difficulty. Crossing was carried out by setting up pupae in individual tubes and sexing the adults before liberation in cages. There was thus no possibility of females being fertilized before liberation in the appropriate cages. Crossing was carried out by means of bulk lots of 40 to 100 males and females. Crossing of individual males and females was found to be very difficult and was abandoned. The results are shown in Table I.

Table 1.

Results of Crossing A. scutellaris scutellaris *and* A. scutellaris katherinensis.

Number of Experiment.	Numbers of Sexes and Subspecies.		Approximate Number of Eggs Produced	Period of Egg Production.	Number of Eggs Hatched.	Percentage Eggs Hatched.
	scutellaris.	*katherinensis.*				
1	60♂♂	49♀♀	1970	28/3/48 to 19/4/48	0	0
2	37♀♀	50♂♂	1490	26/3/48 to 19/4/48	1490	100
3	55♂♂	99♀♀	2160	20/8/48 to 4/9/48	0	0
4	62♀♀	56♂♂	1900	21/8/48 to 15/9/48	1900	100
5	—	64 virgin ♀♀.	340	7/5/48 to 27/5/48	0	0

It will be seen from Table 1 that ♀ *scutellaris* × ♂ *katherinensis* gave normal numbers of fertile eggs. These eggs were subsequently bred through to the adult stage, and perfectly normal F1, F2 and F3 generations of adults were obtained. The reciprocal cross, however, proved completely sterile, no development of the embryo taking place within the egg. In these sterile crosses copulation was frequently observed, and ten females selected from Experiment No. 3 on 4th September, 1948, when dissected, showed living spermatozoa in the spermathecae. It will also be noted that small numbers of sterile eggs were deposited by virgin females of *katherinensis*, and that mating provided an obvious stimulus to egg production even when the eggs were sterile. While there are numerous examples in the literature of sterility or partial sterility in F1 adult hybrids, this complete sterility of F1 eggs in one cross while the reciprocal cross is completely fertile down to the F3 generation, appears to be unusual. The only similar record is that of a cross between *A. aegypti* and *A. albopictus*, made by Downs and Baker (1949). These authors state that *albopictus* males crossed with *aëgypti* females gave fertile progeny to the F2 generation, but that the reciprocal cross was unsuccessful. In this unsuccessful cross twenty-four females were dissected, but

only one showed spermatozoa, although copulation had been observed, and only a few eggs were deposited.

Examination of the chromosomes in the testes of *scutellaris* and *katherinensis* has not so far shed any light on the problem. The only morphological difference between the two subspecies is a distinct line of white scales on the anterior surface of the mid-femur, this white line being present in *katherinensis* and absent in *scutellaris*. The F1 adults of the fertile cross all show an intermediate condition, i.e., a few scattered white scales, while in the F2 adults the character referred to above is either present, intermediate or absent. In one series of F2 adults the line of white scales was present in 85 individuals, showed an intermediate condition in 181, and was absent in 99, suggesting a 1:2:1 ratio.

Conclusions.

It would appear from the above experiments that if *scutellaris* and *katherinensis* were present in the same area they would interbreed and produce a population showing all degrees of intergradation between the two forms, since, as far as is known, they occupy similar ecological niches, unless some unknown biological factor prevented them from mating under field conditions. Nevertheless, some differentiation must have taken place, as evidenced by the sterile reciprocal cross, and it is therefore concluded that one is justified in regarding these two forms as subspecies. It is hoped to carry out further studies to determine whether there are any inherent differences in the two subspecies in relation to temperature and humidity.

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